

REMARKS

Entry of the foregoing and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-27 were pending. By the present response, claims 1, 19, 23 and 26 have been amended and claims 28-62 have been added. Thus, upon entry of the present response, claims 1-62 remain pending and await further consideration on the merits.

The amendment to allowed claim 1 is submitted only to address a grammatical error.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: the original claims, Figures 1, 3 and 5, and the specification, paragraphs [0021] – [0025], [0030] – [0032], [0034], and [0044] - [0045].

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 19-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. to 6,359,681 to Housand et al. (hereafter "*Housand et al.*") on the grounds set forth in paragraph 3 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The presently claimed invention is directed to an imaging optical apparatus, a method of gathering imagery from a target and a method of constructing an imaging optical apparatus. In exemplary embodiments, multiple wavelengths, e.g., a FLIR wavelength, a laser designated wavelength, and a laser ranger wavelength, are

optically viewed and manipulated by common optically significant elements of the apparatus, e.g., a primary and a secondary optical elements. The material, prescription, and coatings of the optically significant elements are selected to allow manipulation of the different wavelengths of energy and projection of at least two of the wavelengths at a common focal plane on a single detector.

Applicants' independent claims broadly encompass the above apparatus and methods.

For example, independent claim 19 recites that an imaging optical apparatus comprises, *inter alia*, a first optical system having a first field of view for projecting at least a first portion of incident radiation emitted from a target to a first focal plane, a second optical system having a second field of view narrower than the first field of view for projecting at least a second portion of the incident radiation to a second focal plane, and a third optical system configured to receive radiation reflected from the target, the third optical system being selectable to project the reflected radiation to the second focal plane. The second and third optical system share an entrance aperture and the first focal plane and the second focal plane are incident. The second and third optical systems also include a common primary mirror wherein the common primary mirror is a Mangin mirror with a narrow band coating.

Independent claim 23 is directed to a method of gathering imagery from a target. The method comprises the steps of, *inter alia*, receiving radiation emitted from a target in a first wavelength range using a first optical system having a wide field of view (WFOV), the first optical system projecting a WFOV image onto a first detector, receiving radiation emitted from the target in the first wavelength range using a second optical system having a narrow field of view (NFOV), the second

optical system projecting a NFOV image onto the first detector, and receiving radiation in a second wavelength range using a third optical system, said radiation in the second wavelength range being emitted from a first designator laser toward the target and being reflected by the target, the third optical system projecting a designator image onto the first detector. The second and third optical systems share an entrance aperture and the NFOV image and the designator image can be simultaneously projected under the first detector. The second and third optical systems also include a common primary mirror wherein the common primary mirror is a Mangin mirror with a narrow band coating.

Independent claim 26 recites that a method of constructing an imaging optical apparatus comprises the steps of, *inter alia*, providing a first detector, providing a first optical system having a wide field of view and being configured to receive radiation emitted from a target in a first wavelength range. The first optical system being selectable to project a wide field of view image onto the first detector, providing a second optical system having a narrow field of view and being configured to receive radiation emitted from the target in the first wavelength range. The second optical system being selectable to project a narrow field of view image onto the first detector, and providing a third optical system configured to receive radiation in a second wavelength range emitted by a first designator laser toward the target and reflected from the target, the third optical system being selectable to project a designator image onto the first detector. The second and third optical systems share an entrance aperture and the narrow field of view image and the designator image can be simultaneously projected onto the first detector. The second and third optical

systems include a common primary mirror wherein the common primary mirror is a Mangin mirror with a narrow band coating.

Housand et al. discloses a combined laser/FLIR optic system. As described at column 6 and in reference to Figure 4, IR energy enters a segmented target acquisition window and is collected by a common pitch/yaw gimbal afocal 401. *Housand et al.* explains that "common" refers to the use of the same aperture to transmit and/or receive IR energy as well as laser energy and is actually a set of lenses comprising one positive lens 401a and two negative lenses 401b and 401c. IR energy is then directed to a turning mirror 403 which directs the IR energy down to pitch-axis center line 405. Turning mirror 406 then redirects the laser energy and the IR energy parallel to the system longitudinal axis where it encounters Dichroic D1 located within the FLIR relay/FOV assembly 407. Dichroic D1 separates the incoming energy based on spectral content by transmitting energy having wavelengths greater than 2.7 microns and reflecting energy having wavelengths shorter than 2.0 microns. Additional fixed lenses and movable lenses (411 and 412) are also included in the apparatus of *Housand et al.*

The rejection of the claims at issue here is improper because the Examiner has not established a *prima facie* case of obviousness based on the disclosure in *Housand et al.*

According to MPEP §2143-2143.03, there are three basic criteria to establish a *prima facie* case of obviousness. First, there must be a suggestion or motivation to modify the reference or combine the teachings. Second, there must be a reasonable expectation of success for the proposed modification of combination. Third, the reference must teach or suggest all of the claimed limitations. In this case, the

rejection of Applicants' claims over *Housand et al.* is improper because the cited document does not teach or suggest all of Applicants' claimed limitations.

As previously noted, Applicants' independent claims 19, 23 and 16 each recite that "the second and third optical systems include a common primary mirror" and "the common primary mirror is a Mangin mirror with a narrow band coating." In contrast, *Housand et al.* does not disclose the use of a Mangin mirror. Rather, *Housand et al.* uses a series of positive and negative lenses. In addition, *Housand et al.* does not disclose the use of a Mangin mirror with a narrow band coating. Moreover, the disclosure of *Housand et al.* does not suggest the use of a Mangin mirror as presently claimed by Applicants. Thus, the disclosure in *Housand et al.* does not teach or suggest all of the claimed features of Applicants' independent claims 19, 23 and 26. Accordingly, a *prima facie* case of obviousness has not been established and the rejection based on the disclosure in *Housand et al.* is improper and should be withdrawn.

The remaining claims rejected in the Official Action depend from Applicants' independent claims and are therefore improperly rejected over the disclosure in *Housand et al.* for at least the same reasons as discussed above. Withdrawal of these rejections is respectfully requested.

NEW CLAIMS

New claims 28-62 have been added. These new claims address additional features of Applicants' claimed imaging optical apparatus, method of gathering imagery from a target and method of constructing an imaging optical apparatus.

First, each of these claims depend from an allowable independent claim and are therefore also allowable.

Furthermore, the features of these new claims, e.g., the descriptions of the first, second, third and fourth optical systems, the description of the primary mirror, the use of a narrow band coating, a rugate coating on the backside of the primary mirror, a combination of a lens and a Mangin mirror as a optically significant surface, the inclusion of a mirror within an opening in the combination of the lens and the Mangin mirror and the passive athermalization, distinguish over the disclosure in *Housand et al.* Accordingly, these claims are allowable for at least the same reason as discussed above with respect to the independent claim from which they depend as well as for these additional features.

ALLOWABLE SUBJECT MATTER

Applicants note with appreciation the indication that claims 1-18 are allowed as noted in paragraph 4-5 of the Official Action. However, from the above discussion, Applicants respectfully assert that all of claims 1-62 are allowable over the cited document.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: March 16, 2004

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

By: 

Jeffrey G. Killian
Registration No. 50,891